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CHEMICAL & ENGINEERING

NEWS

National Chemistry Week aims to boost chemistry's image Page 44

FINAL PROGRAM PACIFICHEM '89 in Honolulu Page 53

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Stock ownership plans gain favor with companies, employees

Page 9

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NEWS

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OCTOBER 2, 1989

News of the Week

■ **Despite lawsuit, plans proceed for Oct. 12 launch of Galileo spacecraft mission to Jupiter.** Page 4

■ **Canadian biotechnology company, Connaught Biosciences, accepts takeover offer from Institut Merieux, a French biologicals firm.** Page 5

■ **Satellite measurements indicate rapid ozone destruction above Antarctica.** Page 5

■ **U.S.-U.S.S.R. accelerate efforts to spur chemical arms negotiations.** Page 6

■ **Materials scientists and engineers seek more public, political backing for their field.** Page 6

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Dow remains committed to petrochemicals despite its increased stake in consumer products and specialties. **Page 13**

Government

International gathering in Geneva aims for agreement on mechanisms for coping with global climate change; study concludes research experience to date is sufficient for scientists to make safe decisions regarding field tests using gene-altered organisms; Superfund operation reported to be hampered by built-in disincentives. **Page 15**

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Final Program

Program for PACIFICHEM '89 in Honolulu, Dec. 17-22, includes listing of technical papers, general events, registration form. **Page 53**

Cover: Photo by Jon Feingersh/ Uniphoto Picture Agency

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Cover Story

Employee stock ownership plans, advantageous to the employer as well as the worker, are drawing a lot more attention among companies, including several chemical makers. **Page 9**

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LETTERS

Help for meeting expenses

SIR: I read with interest Raymond Seymour's letter on taxed meeting expenses (C&EN, July 24, page 3). I, too, am an underfunded faculty member. I have been audited twice in the past few years, and had no difficulty defending the deduction for expenses for travel to ACS and other meetings to serve on committees, give papers, chair sessions, or just attend papers.

The Internal Revenue Service looks for a contemporaneous record of expenses including date, location, purpose, item, and amount. A printout from a credit card does not provide all of these, nor does it prove that you paid the bill. It is also helpful to request funds from your department; even a rejection or $10 assistance provides a record that your supervisor approved your professional need to attend, but could not provide funds.

If you do not request assistance, the deduction may be disallowed, because IRS may claim that you could have been reimbursed, and you have no proof to the contrary. I am not a tax expert, but I am convinced there is no need for panic. I recommend an annual publication—"Tax Guide for College Teachers"—for further advice about record keeping.

Linda M. Sweeting
Towson State University

Genetic screening and ethics

SIR: The excellent article on genetic screening (C&EN, Aug. 7, page 10) stresses the urgent need for society to develop some rational policies for dealing with the numerous ethical questions we can already foresee. However, extrapolating even further, I foresee a much greater question of ethics with the potential for destroying the basis of our society.

If we trace the progress made over the past 10 or 20 years in the understanding, at a molecular level, of the functioning of life, then it seems to me a not too improbable extrapolation that we will "explain" all of life in terms of chemical (biochemical?) reactions and the laws (of thermodynamics) that govern them. Any individual action will then be seen not as one of free choice but rather the inevitable result of the interaction of current, external stimuli with the contents of the individuals' memory banks.

What does this do to our view of individual responsibility? I shudder to think, and I see no escape. Science fiction? Look back at the progress I referred to above and contemplate how much chemical control we are able to exert, even now, over physical, mental, and emotional bodily functions.

Our struggle with ethics hasn't started yet.

Brian Kipling
Calgary, Alberta

Patent protection

SIR: I write to comment on an obviously unintended inference that might be drawn from one of the comments in William Lovell's letter (C&EN, Aug. 14, page 3). The single largest misconception that the public has about patents is that they directly protect the owner's right to practice his or her invention. Instead, the patent gives its owner the right to exclude third parties from using his or her invention. (This right is analogous to the right of a homeowner to exclude third parties from trespassing on his property.)

The patent right of exclusion can, of course, be extremely valuable where others will pay high royalties for a license, or where, because of the patent and the absence of relevant third-party patents, the owner of the patent in question is the only one who can lawfully practice an important invention.

But the only protection of "the right to practice an invention" offered by a patent is the indirect protection that it affords by preventing or limiting third parties from obtaining patents on their later inventions directed to the same or similar idea.

Nathaniel D. Kramer
Sprung Horn Kramer & Woods
New York City

Safety of nuclear power

SIR: In the book review on "The Social Impact of the Chernobyl Disaster" by David R. Marples (C&EN, July 17, page 38), the reviewer, C. P. Wolf, included a serious error by implying that the Hanford N reactor design is similar to that of the Chernobyl RBMK-type reactor from the standpoint of safety. We are not certain that this error is introduced by the reviewer, or was also stated by the book's author.

The Hanford N reactor, like the RBMK, is light-water-cooled and has a graphite moderator with its fuel contained in pressure tubes. However, that is where the similarity with the Chernobyl reactor stops. Unlike the RBMK reac-

More Companies Offer Employee Stock Ownership Plans

Benefit plans that put shares in employees' hands provide worker incentive, can give companies tax advantage and protection against takeovers

Ann M. Thayer,
C&EN Northeast News Bureau

Employee stock ownership plans (ESOPs) are not new. Yet they have been attracting a lot of attention in the past year. Several companies in the chemical industry are among those recently setting up such plans. It is estimated that by the end of this year more than 10 million employees will be covered by one form or another of an ESOP. Although that figure is more than triple what it was 10 years ago, the increase in borrowing by companies to finance these plans is even more dramatic.

Borrowing has gone from a level of $1.2 billion in 1986 to $5.5 billion in 1987 to $6.5 billion in 1988, and may exceed $20 billion in 1989, says the National Center for Employee Ownership (NCEO), a nonprofit research organization located in Oakland, Calif. In 1989, nearly 85% of the money loaned will be to larger, public companies that account for only 10% of all plans, says Gianna Durso, project manager at NCEO.

Some companies in the chemical industry, such as Aristech Chemical, Betz Laboratories, FMC, Olin, and PPG Industries, have plans that are tailored to their specific interests and outlook. But the reasons behind the boom in ESOPs, and what make them attractive, generally are the same for most companies. These include corporate tax advantages, an opportunity to introduce a new form of employee benefit, and a degree of protection from hostile takeovers.

An ESOP has several basic features. Most public companies have leveraged plans. A company establishes a trust, which then borrows money to purchase shares of company stock. The loan is usually guaranteed by the company. Cash received from the sale of stock to the trust is available for corporate purposes. Meanwhile, the company, through dividend payments and contributions to the trust, helps to repay the loan. Employees are allocated shares, the number of which is typically based on a relative salary scale or company matches in employee savings plans.

An ESOP also provides a company with some significant benefits. Payments, of an amount up to 25% of the payroll of ESOP participants, made to the trust and used to pay off both the interest and principal on the loan are tax deductible. Dividend payments are also deductible if used to pay down the debt or passed on to employees. In addition, half of the interest income for the lender in a leveraged ESOP is tax deductible. Thus resulting loan rates have been about 90% of prime, or sometimes less, according to NCEO.

Call: tied to company performance

The high levels of borrowing, in light of the tax advantages, have attracted the attention of the federal government. "The U.S. General Accounting Office has estimated that ESOP borrowing will cost the government about $8 billion in lost revenue over the next five years," says Durso, "and Congress is concerned about that."

The purpose of an ESOP, as written into the legislation, is to increase and broaden employee ownership in U.S. business, she explains. However, because of the tax advantages over other employee benefits programs, some companies are replacing existing benefits with ESOPs. Although employees may not lose anything by this, she adds, Congress doesn't necessarily want taxpayers footing the bill, while companies are spending less to provide the same level of benefits.

This led to the introduction of a bill this summer by the House Ways & Means Committee to cut the interest exclusion for lenders. The proposed legislation was intended to cut the borrowing but had little effect on the number of ESOP announcements. Another proposal was then added to the legislation cutting the allowed deduction on dividends.

"That seems to have had the desired effect," says Durso. Although the legislation in the House has not yet been passed, there has been a dramatic drop-off in the number of

announcements. Bills also have been introduced in the Senate to limit the interest exclusion on plans with less than 20 or 30% ownership, which is consistent with ownership levels in many private companies.

For public companies, NCEO estimates that the average amount of stock in employee ownership plans ranges from 5 to 15%. The level of ownership has important consequences in defending against a takeover. The Delaware statute, under which many companies are incorporated, stipulates the percentage of shares that must be voted to approve a takeover.

"In order to approve an acquisition, you need the affirmative vote of 85% of nonaligned shares," says Lilli Gordon, director of research at Analysis Group, an economic and financial consulting firm in Belmont, Mass. "So if you have 15% of nonaligned shares in friendly hands, that basically gives you veto power." But only a fraction of the plans, about 20%, are of sufficient size to have control, she notes. NCEO reports that as many as a third of the plans in public companies are put in as takeover defenses.

Gordon calls such plans "anticipatory takeover defenses" that are put into effect before any takeover move is made. "Poison pills were too transparent," she says. (Poison pills are shareholder rights plans that result in premium share prices.) "Companies tried to uphold their poison pills and it was clear that their only purpose was to deter a hostile takeover." It is generally believed that the courts will uphold the votes of shares held in an ESOP because of the precedent set in a case surrounding the attempted takeover of Polaroid by Shamrock Holdings.

Polaroid instituted an ESOP, with enough shares to repel a takeover, a few weeks before the company was approached. In a suit brought by Shamrock, the Delaware Court upheld the ESOP as an employee benefit that the company had been considering for some time, rather than simply a takeover repellent. Observers believe that companies will use the Polaroid ESOP as a guide, but suggest that, to be upheld in the courts, the plans must be in place as employee benefits prior to any takeover attempt.

Aristech Chemical, in business for just under three years, believes that it is good business to align the interests of its employees with those of its shareholders through two ESOPs, says J. Harry Varner of investor relations. During the past six months, however, Jon M. Huntsman of Huntsman Chemical has acquired more than 7% of Aristech's stock and has expressed an interest in the company (C&EN, June 12, page 7). Slightly more than 16% of Aristech's outstanding shares are held by the two plans.

One Aristech ESOP contains 3.6 million shares of common stock financed under a 10-year variable rate loan of $72.9 million. The second contains $60 million worth of a new issue of voting preferred shares, leveraged over 15 years, convertible to 2 million shares of common stock. The plans operate as most plans do in terms of loan repayments, allocation of shares, eligible employees, and voting and dividend rights.

As company contributions to the trust are used to service the loans under a set amortization schedule, those shares paid off are allocated to employees. The percentage of shares allocated to an employee's account is equal to the percentage an individual's salary represents in the total payroll of covered employees. The shares on account, or their cash value, become the property of an employee upon retirement or leaving the company.

The two plans differ only slightly since they are based on different types of stock. For the common shares, an employee receives the current market value when cashing out of the plan, whereas the preferred shares have a guaranteed value. Dividends on preferred shares are fixed and are used in part to pay down the debt. Dividends on the common shares can be used in the same way, passed through to employees, or used to purchase more shares.

Voting rights to allocated shares are given to the employees. And, as in the Polaroid plan, the shares remaining in trust are voted by a trustee, usually a financial institution, in the same proportion that the employees voted. This is a commonly used means of voting the shares. Other possibilities include voting all the shares in trust as the majority votes, or voting them independently. Exactly how the shares in trust are voted has the potential of becoming an issue, especially in a takeover.

For shares to be considered unaligned in an acquisition, employees must be allowed to vote their shares confidentially. "A company has to assume that its employees are going to vote with it, which

Stock plans growing in chemical companies

Several companies in the chemical industry have established employee stock ownership plans (ESOPs) in the past two years. Most plans are leveraged with a trust established to borrow money and to purchase shares of stock from the company. For the five companies whose plans are summarized below, this debt totals more than $800 million.

Company	Effective plan date	Type of stock	Number of shares (millions)	% of total	Plan debt ($ million)
Aristech	1/88	Common	3.6	10.4%	$ 72.9
	1/89	Convertible preferred	(2.0 common)	5.8	60.0
Betz Laboratories	6/89	Convertible preferred	0.5 (1.38 common)	9.0	100.0
FMC Corp.[a]	4/89	Convertible preferred (nonvoting)	na	na	300.0
Olin Corp.[b]	7/89	Convertible preferred	1.4	7.0[c]	100.0
PPG Industries[b]	1/89	Common	6.0	5.5[d]	250.0

a Plan announced but not in place pending federal tax legislation on ESOPs. Will replace savings plan with 38% of outstanding shares. b ESOP formed to provide future contributions to existing savings plan. Level of company match to employee savings based on annual return on equity. c Shares in ESOP and savings plan total about 24%. d Shares in ESOP and savings plan total about 14%. na = not available.

isn't always the case," says Durso. "Employees will naturally take employment security and other factors into account when voting their shares." A letter written by the Department of Labor to Polaroid called into question whether the voting rule allowed the trustee to fulfill its fiduciary duty.

FMC created an ESOP in April that essentially avoids this problem. The plan is based on a new series of nonvoting, nondilutive convertible preferred stock to be financed through a $300 million loan. The stock is to be converted to common stock upon allocation to employee accounts, but the shares remaining in trust are nonvoting shares.

Citing the advantages of lower cost financing, the company plans to replace its existing 401K thrift plan with the ESOP. The 401K plan, in which 60% of a maximum of 5% of an employee's salary is matched by the company in common stock, currently holds 36% of FMC's 36 million outstanding shares. However, the company has delayed implementing the plan until the outcome of the proposed tax legislation is known.

Other companies have gone ahead with ESOPs either because the tax advantages are not a major factor or because there is some hope that plans put in place now will be covered under the tax laws. In addition, once in place, it becomes much easier to expand an ESOP and add to the number of shares owned by employees. Betz Laboratories instituted an ESOP with 9% of its outstanding shares in late June as a supplement to its retirement plan and to encourage employee ownership in the company.

The ESOP includes the sale of half a million shares of convertible preferred stock to a trust. A $100 million loan for the purchase of the shares is to be paid off on a 20-year amortization schedule. R. Dale Voncanon, vice president of finance at Betz, indicated that by using preferred stock in the ESOP the company can set a higher dividend rate than on the common stock, and therefore get a higher tax deduction. At a point where the dividend on the common stock exceeds that of the preferred, it makes sense for the trust to convert the shares into 1.38 million common shares.

Campbell: improve return on equity

Whereas many plans, such as Aristech's, are nonparticipatory, PPG Industries has made its ESOP part of an existing employee savings plan. The company matches up to 6% of an employee's salary in PPG stock on a variable scale that ties the plan to company performance. "The match increases from a minimum of 50% of 6%, or 3%, to a maximum of 100% of 6% as the company's return on equity increases from about 15% to 22%," explains Lawrence M. Call, treasurer of PPG. Return on equity is the ratio of a company's net income to its net worth.

PPG contributes shares from a leveraged ESOP of 6 million shares of common stock. "In simple terms," he says, "we have essentially prefunded the employer's contributions to the savings plan." The PPG savings plan has been in place many years as an employee benefit, he explains. "The employees who are participants in the savings plan did not see anything happen except that we told them that we had changed the savings plan to an ESOP. The risks and rewards are identical."

One change that had to be made was to give employees the option to receive dividends or have the dividends reinvested for additional shares. Dividends can be viewed as a short-term reward for employees in plans that are essentially long-term benefits, since the actual shares become the property of an employee only upon leaving the company or retirement. With other bonus and profit-sharing programs, PPG does not consider its ESOP an incentive program except to the extent that it encourages investment, points out Call.

Olin Corp., with a plan similar to that of PPG's, is focusing more on having employee ownership work as an incentive to improve company performance. "Olin is striving to improve its return on equity and to improve the value that it returns to shareholders," says Michael E. Campbell, vice president, human resources. "Our goal is to achieve, on a reasonably consistent basis by the early 1990s, a 20% or better return on equity."

In trying to enhance its existing employee savings plan, the company decided to increase the company match of 50% of the first 6% of an employee's salary when its return on equity goes above 14%. For every point above 14%, the company match increases 5%, so at 17%, which is the goal for 1989, the match would be 65%. The company has put 1.4 million shares, or about 7% of outstanding shares, into an ESOP for future contributions. The proceeds will be used to repurchase its common shares.

Through the existing savings plan, employees already own about 17% of the company's shares. "We think now by marrying the concept of improved return on equity [to the bonus stock match], we will increase the employee commitment to improved performance." Campbell stresses that the plan more closely aligns employees' interests with those of the company's shareholders. "Employees have the greatest impact on the performance of the company and are able to fully share in the benefits of that improved performance, both as employees and as owners of the company."

It can be difficult for an individual to directly affect return on equity, admits Campbell. "However, all of us working together in terms of cost savings, in improving quality to become a preferred supplier and therefore have improved sales and margins, will impact return on

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equity." Research shows, says Durso of NCEO, that combining employee ownership with a participative style of management can help a company grow 8 to 11% faster per year than competitors. "The ownership provides the incentive, and the participative management provides the means for getting employees involved," she says, However, NCEO stresses that both are needed to have an effect.

"There is a perception that the driving force in ESOPs is financial in nature," says Campbell of Olin. "Obviously the financial implications were carefully considered but, if you are just driven by that, you may save money in the short term but it's not going to be an effective tool for improvement over the longer term." Olin boasts 80% overall participation in its savings plan.

The plans fall under the Employee Retirement Income Security Act (ERISA), which governs employee benefits. ERISA requires that the plans allow for equitable participation among employees with union employees allowed to bargain into the plans. The plans are considered long-term benefits and there is usually a vesting period of five to seven years. At the age of 55, an employee can have access to his or her shares in order to diversify the account. Another way to ensure employees of some downside protection, especially when the ESOP is used as a retirement plan, is to guarantee a minimum stock value.

Although employees can share in the growth of companies, there is also a downside with benefits tied to stock prices. Most plans, except Aristech's preferred stock plan, are supplements to, or restructurings of, existing retirement plans or savings plans and present little risk or require few concessions on the part of employees. It is still too early to know how successful the plans will be as employee benefits or whether there will be an impact on measures such as return on equity. However, observers believe that the restructuring of benefits will continue as costs of benefits increase and companies are able to take advantage of the tax benefits and flexibility offered through capital accumulation plans such as ESOPs. □

International Gathering Aims for Pact on Climate Change Problem

More than 40 national groups meet in Geneva to thrash out multilateral limits for global change; situations of Third World nations given emphasis

Representatives of more than 40 countries are meeting in Geneva this week to devise possible mechanisms for coping with global climate change. The effort is a first step toward negotiating an international agreement on climate warming, says Frederick M. Bernthal an assistant secretary in the State Department.

"Global climate change could be the dominant foreign policy issue of the next century," Bernthal told a recent conference in Washington, D.C., on global-change decision-making. He stressed that any attempts to limit the emissions of greenhouse gases that lead to climate warming must be international if they are to have a significant impact. "It's an absolute necessity that developing countries be brought along in the process," he says.

The U.S. strategy of working toward multinational solutions is firmly supported by the Global Climate Coalition, a new Washington, D.C.-based business association. Yet some members of Congress and environmental groups are arguing that the U.S. should act unilaterally to curb its emissions of carbon dioxide, chlorofluorocarbons (CFCs), and other greenhouse gases.

This week's meeting in Geneva was convened by the Intergovernmental Panel on Climate Change (IPCC), an international forum established by the United Nations Environment Program and the World Meteorological Organization. As head of the U.S. delegation, Bernthal chairs IPCC's response strategies working group.

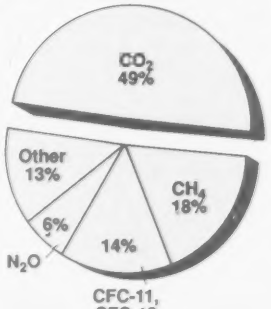
The response strategies group is one of three working groups set up when the IPCC met for the first time last November. The U.K. heads the working group charged with reviewing and assessing the science relevant to climate change, while the U.S.S.R. is chairing a group assessing the possible environmental and socioeconomic impacts of such change.

According to Bernthal, the response strategies group is analyzing both short- and long-term policies that could limit or mitigate global change. At this week's workshop, delegates are attempting to pull together a paper on mechanisms for implementing response strategies, especially in developing countries. One possibility under discussion is an international framework convention (agreement) on climate. The consensus paper will be presented at a plenary session to be held in February, perhaps in Washington.

Although the industrialized world now accounts for most carbon dioxide emissions, Bernthal says, that will change if the Third World is not helped to develop a different mix of energy sources. "If current trends continue," he says, "by the next century half of greenhouse gas emissions will be from the developing world. China plans to double its use of coal by 2000 and India plans to triple its use of coal."

Bernthal warns that developing countries will not support any climate convention if it means they must forgo the economic growth and increased energy use necessary to raise their standards of living. Therefore, he says, the issues of economic aid and technology development and transfer are crucial.

CO_2 is major contributor to greenhouse warming



Note: Estimated contributions to greenhouse warming calculated from atmospheric concentrations and radiative properties of gases.
Source: Environmental Protection Agency

The Administration's position is supported by the Global Climate Coalition which was organized earlier this year by the National Association of Manufacturers to provide a means for businesses to participate in studying climate change and in developing policy responses to the issue. Among the 50 some members are the Chemical Manufacturers Association, Dow Chemical Co., Du Pont, Pennwalt, the Society of the Plastics Industry, and Union Carbide Corp.

"We agree that climate change is a serious issue with enough scientific credibility to warrant the full attention of the business community," says coalition chairman Thomas G. Lambrix, who is director of government relations for Phillips Petroleum Co. Representatives of the coalition are attending the IPCC conference as nongovernmental observers.

Lambrix says that business must shoulder its share of the burden in reducing greenhouse gas emissions, by investing in cost-effective ener-

gy technologies, for example. But he also stresses that the federal government should carefully consider the cost of hasty unilateral actions that will be very expensive and perhaps ineffective.

But other voices are crying for faster action within the U.S. A slew of bills in Congress propose ways to limit global warming. One introduced by Rep. Claudine Schneider (R.-R.I.), for example, would require the U.S. to cut carbon dioxide emissions 20% by 2000.

And environmental groups also want the U.S. to develop its own domestic policy. Rafe Pomerance of the World Resources Institute, who also is attending the meeting in Geneva, says new statistics show that carbon dioxide emissions in the U.S. have been growing faster than those in the rest of the world for the past two years.

"We are the world's largest contributor and right now we don't have a policy on carbon dioxide emissions," Pomerance says. "We can't afford to wait. The quickest way to get multilateral agreement would be to lead by taking action within the U.S., not by increasing our carbon dioxide emissions."

The argument over unilateral versus multilateral action is unlikely to be settled anytime soon. In the meantime, Bernthal says, the U.S. is trying to encourage what he called "no regrets" strategies—that is, steps that make sense in and of themselves. Such strategies include increasing energy efficiency, reforestation in the industrialized and Third World, and eliminating CFCs.

The international community is already well on the road to a complete phaseout of CFCs, which not only catalyze ozone depletion but also account for a sizable portion of greenhouse warming (C&EN, July 24, page 7). Indeed, the process used to reach agreement on CFC use is often proposed as a model for handling climate warming issues.

But the CFC-agreement analogy only extends so far. "The issues of international equity, technology transfer, and economic development raised by CFCs will seem like child's play compared to those of climate warming," Bernthal warns.

Pamela Zurer

Tests of gene-altered organisms deemed safe

A study by the National Research Council of the risks involved in the release of genetically modified plants and microorganisms for scientifically controlled field tests finds there is little or nothing to worry about. It concludes that field-test experience to date gives scientists sufficient information to evaluate risks and make safe decisions.

The report divides the field-testing universe into plants and microorganisms. It does not cover larger animals or the use of genetically engineered organisms to produce other products. The report was done at the request of the interagency Biotechnology Science Coordinating Committee, which is composed of the five federal agencies most involved with biotechnology and genetic engineering.

The most significant contribution of the report is a detailed, tiered decision-making framework for the government offices to use when faced with approving a field experiment. According to chairman of the NRC committee Robert H. Burris, emeritus professor of biochemistry at the University of Wisconsin, Madison, use of the framework will make government testing decisions more consistent.

The framework has three major criteria. The most important factor is familiarity. This refers to how well researchers understand the plant or organisms and how much information has been gained from previous experiments. With regard to plants, familiarity is high because years of traditional crossbreeding research has provided much data. But familiarity with microorganisms is less because they have been studied for less time.

Confinement or control of the organism is the second major criteria on which the report says decisions should be based. Because modified plants are tested in small field plots, confining them is relatively easy, but control of microorganisms is more difficult. "Because less is known, the committee recommends that confinement and potential environmental effects be considered simultaneously," Burris says. "Confinement, in the case of microorganisms, might mean the presence of a temperature sensitive or other type of 'suicide gene' as these become practical and some other modification that would modify [the microorganism's] ecological niche."

Indeed, the third major criterion is concerned with the probable environmental effects should an introduced organism or genetic trait last longer than intended or spread away from the intended target. Questions that need to be asked include: What is the potential for persistence of the organism in the environment? Can it spread to nontarget environments? And, what is the chance of genetic exchange between the target and indigenous microorganisms?

Because the committee was limited to consideration of only research-scale field tests, much of what the report has to say has already been covered in other technical reviews. These include a white paper prepared by the National Academy of Sciences in 1987, a series of studies done by the Congressional Office of Technology Assessment, and a report issued earlier this year by the Ecological Society of America. In addition, many decisions have already been made about release of genetically engineered plants and microorganisms—about 80 field tests have already been approved by the Environmental Protection Agency and the Department of Agriculture.

Another big factor the committee did not consider is how individual states will react to field tests of altered organisms. At least 30 states have or are considering legislation to limit or control tests or the use of genetically engineered products. Burris contends, however, that "as experience builds with handling these organisms, and people see they can be properly regulated and that they cause no harm, they won't be as anxious or frightened of them."

The committee's report, "Field Testing of Genetically Modified Organisms: Framework for Decisions," is available for $19.95 from the National Academy Press, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

David Hanson